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ABSTRACT

This competency-based module uses the Ocean County (New Jersey) Vocational-Technical Schools curriculum-infused model for infusing basic skills instruction into vocational education. The model demonstrates the relationship of vocational skills to communication, mathematics, and science. The document begins with a philosophy statement; preface; a table that explains the number of hours required for academic credit in various programs and the number of those hours that are devoted to basic skills and vocational activities; matrices that show in which courses specific basic skills are taught; a list of objectives; and an explanation of student activities. Most pages in the document are tables that describe the relationship of vocational skills to basic skills within the welding program. These pages are organized by instructional unit and the topics within them. For each topic and associated task(s) are listed the theory and basic skills covered. Also listed are the expected student outcomes. The 13 instructional units included are: orientation; shop practice; introduction to the world of welding; electric welding; oxyacetylene torch; shielded metal-arc welding (stick welding); gas tungsten-arc welding; gas metal-arc welding; flux-cored arc welding; plastic welding; special welding processes; fabrication; and miscellaneous welding information. (CML)

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Competency Based Vocational Curricula

COM-LINK

With Basic Skills And Academic Linkages

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In Cooperation With The

New Jersey State Department of Education

Division of Vocational Education

And

Ocean County Vocational-Technical School

U.S. DEPARTMENT OF EDUCATION
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Ocean County Vocational-Technical School

Welding

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PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiences with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district are included. The totality of this package is designed to facilitate the vocational teaching process and to enchance the learning experiences of our students.

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
AIR CONDITIONING, REFRIGERATION AND HEATING	900	140	120	120	520
AUTO BODY REPAIR	900	130	120	125	525
AUTOMOTIVE MECHANICS	900	150	120	120	510
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	900	216	126	125	433
BEAUTY CULTURE I AND II	1000	240	120	130	515
BUILDING TRADES	900	135	120	130	515
BUSINESS RELATIONS - MEDIA/MODELING	450	200	60	40	150
CHILD CARE AIDE	900	240	120	122	418
COMMERCIAL ART AND PRINTING	900	120	215	75	580
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	900	130	125	130	515

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COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION	900	150	125	80	545
CUSTOM CABINETMAKING	900	130	120	60	590
DENTAL ASSISTING	450	168	65	77	140
DESIGN DRAFTING	900	135	150	165	450
ELECTRICAL TRADES	900	106	120	124	550
FASHION MERCHANDISING	450	200	60	40	150
FOOD SERVICES	900	206	132	125	437
INDUSTRIAL AUTOMATION AND ELECTRONICS	900	129	140	132	499
INTERIOR DESIGN	900	210	130	120	440
LANDSCAPING AND GREENHOUSE TECHNOLOGY	900	125	125	175	475

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

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900 hours - 2 year course at O.C.V.T.S.
1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
MARINE ENGINE AND BOAT SERVICES	900	164	120	125	491
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	450	173	60	77	140
MEDICAL SKILLS AND RELATED HEALTH CAREERS	450	135	65	125	125
MEDICAL SKILLS (ADVANCED)	450	125	60	125	140
PLUMBING AND HEATING	900	140	120	120	520
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	900	125	130	60	585
T.V. AND COMPUTER REPAIR	900	125	150	175	450
WELDING	900	135	120	100	545

COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School.
The asterisk indicates that the topic is studied in that curriculum.

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
CHILD CARE AIDE	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*

COMMUNICATION SKILLS - CONTINUED

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
DESIGN DRAFTING	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
FOOD SERVICES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*		*	*			*	*	*	*	*	*	*	*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WELDING	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

MATHEMATICS SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. The asterisk indicates that the topic is studied in that curriculum.

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*	*	*	*	*	*	*	*	*		*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*			*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*		*	*		*			*			*
CHILD CARE AIDE	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*		*	*	*		*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*		*	*			*

MATHEMATICS SKILLS - CONTINUED

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
DESIGN DRAFTING	*	*	*	*	*	*		*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*		*	*	*		*
FOOD SERVICES	*	*	*	*	*	*		*	*	*		*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*	*	*	*		*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*		*	*	*		*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*	*	*	*		*			*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*	*	*	*		*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*			*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*		*	*	*
WELDING	*	*	*	*	*	*		*	*	*	*	*

SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits in your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
AIR CONDITIONING, REFRIGERATION AND HEATING							*	*	*	*	*	*		*	*	*				*	*	
AUTO BODY REPAIR								*	*	*	*	*	*	*	*					*		*
AUTOMOTIVE MECHANICS								*		*	*	*	*	*	*	*				*		
AUTOMOTIVE DIESEL AND ENGINE REBUILDING								*		*	*	*		*	*	*	*			*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*				*	*	*	*		*	*					*	
BUILDING TRADES							*	*	*	*	*	*	*		*	*		*		*		
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	N	* O	* T	* A	V	* A	I	L	A	B	L	E										
CHILD CARE AIDE	*	*	*	*	*	*			*		*	*		*	*			*	*		*	*
COMMERCIAL ART AND PRINTING CAREERS	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*		*	*						*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*		*		*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	N	O	T	A	V	* A	I	* L	A	* B	* L	* E	*		*	*						*
CUSTOM CABINETMAKING	* N	O	T	A	V	A	I	* L	A	* B	* L	* E			*			*				
DENTAL ASSISTING	*	*	*	*	*	*				*	*	*	*								*	*

SCIENCE SKILLS - CONTINUED

	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
COURSE	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
DESIGN DRAFTING							*	*	*	*		*	*		*	*	*			*		*
ELECTRICAL TRADES							*	*	*	*	*		*	*	*	*	*		*			
FASHION MERCHANDISING	*	*	*	*		*		*		*	*	*	*								*	
FOOD SERVICES					*	*		*	*		*	*	*		*				*		*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS								*		*			*	*	*	*	*			*		
INTERIOR DESIGN		*	*			*	*	*	*	*	*	*	*		*	*						
LANDSCAPING AND GREENHOUSE TECHNOLOGY							*	*	*		*	*	*		*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE								*	*	*	*	*	*	*	*	*		*		*		
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	N	* O	* T	* A	* V	* A	I	L	A	B	* L	E										*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*		*	*					*			*		*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*		*	*					*			*		*	*
PLUMBING AND HEATING					*		*	*	*	*	*	*			*	*		*		*		*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	N	O	T	A	V	A	I	* L	A	* B	* L	* E	*	*	*	*				*		*
T.V. AND COMPUTER REPAIR										*	*	*	*	*	*	*				*		
WELDING								*		*	*	*	*	*	*	*				*		

COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in the welding trades.

2. To present 900 hours of instruction and practice in the welding trades in accordance with the course curriculum and skill profile outline.

3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the welding skill profile.

4. To help each student develop positive attitudes and ideals related to their occupation in the welding trades and understand their own capabilities and potential.

5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as the basic tenets of democracy. Within the context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

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WELDING

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UNIT: ORIENTATION

TOPIC: SCHOOL RULES AND REGULATIONS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. School rules and regulations	A. Student rights and responsibilities B. Student grievance procedures C. Student expectations D. School code of discipline E. Attendance and graduation policy F. Student transfers G. Grading system H. Accidents I. Bedside instruction J. Cooperative Industrial Education (C.I.E.) K. Driving policy L. Drug/alcohol policy M. Early dismissal procedures N. Lockers O. Driver permits P. School closing procedures Q. Smoking R. Student progress reports S. Telephones T. Theft U. Tools and equipment	A. Note taking skills B. Filling out forms C. Oral communication D. Functional reading skills (Student Handbook) E. Test taking skills			A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions Written test B. The student will know the standards to be met within the school, classroom and lab

UNIT: ORIENTATION - CONTINUED

TOPIC: WELDING CLASS RULES AND REGULATIONS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Welding class rules and regulations	A. Attendance B. Request for make-up work C. Requirements for each marking period D. Notebooks, etc. E. Daily grading system F. Dress requirements G. Work orders H. Supplies I. Textbooks used J. Job outlook and opportunities K. Cooperative Industrial Education (C.I.E.) L. Work attitude M. Fire drills	A. Note taking skills B. Filling out forms C. Oral communications D. Functional reading skills			A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions B. The student will know the standards to be met within the school, classroom and lab

UNIT: ORIENTATION - CONTINUED

TOPIC: GENERAL SHOP SAFETY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
1. General shop safety	A. Working in a "real world" setting B. Accident prevention C. Working with a safe attitude D. Shop layout E. "Panic" buttons F. Floor spills G. Accident reporting	A. Note taking skills B. Discussion			A. The student will be able to understand the shop dangers in a typical welding shop B. The student will be able to understand the process of reporting an accident

UNIT: ORIENTATION - CONTINUED

TOPIC: FIRE SAFETY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Fire safety	A. Fire extinguishers B. Fire blankets C. Fire prevention D. A clean shop is a fire safe shop E. Reporting a fire F. Combustibles G. Non-combustibles H. Fire dangers in the welding shop I. Matches and lighters	A. Following directions B. Note taking skills	Percentages	A. Heat B. Fire C. Spontaneous combustion D. Pressurized gases	A. The student will be able to demonstrate safe fire practices B. The student will be able to identify fire dangers in the welding area C. The student will be able to demonstrate the use of fire fighting equipment including the identification of types of fire extinguishers D. The student will be able to pass a written test on fire safety

UNIT: ORIENTATION - CONTINUED

TOPIC: PERSONAL SAFETY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Personal safety	A. Welding goggles B. Welding helmets C. Lens number system D. Protective clothing E. Ultra-violet (U.V.) light F. Lifting G. Holding H. Respirators/ventilation I. Gloves for welding J. Attitude	A. Listening skills B. Note taking skills	Whole numbers	A. Ultra-violet radiation B. Toxic fumes	A. The student will be able to demonstrate safe practices in the welding area B. The student will be able to demonstrate the proper use of personal protective equipment C. The student will be able to pass a written test on personal safety

UNIT: ORIENTATION - CONTINUED

TOPIC: CAREER OPPORTUNITIES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Career opportunities	A. Welder 1. General 2. Construction 3. Repair 4. Aircraft 5. Ship building (marine) 6. Ornamental iron worker 7. Automotive repair 8. Pipe welder 9. Power plants 10. Automotive building 11. Space industry 12. Underwater 13. Other specialty areas B. Maintenance 1. Factory 2. Assembly line 3. Power plants 4. General maintenance C. Business and industry 1. Small business owner/ operator 2. Sales in welding area 3. Factory representative 4. Welding supervisor 5. Welding inspector D. Education 1. Instructor (public or private) 2. Technical writer	A. Note taking skills B. Discussion			The student will be able to be aware of the employment opportunities related to the welding profession

UNIT: SHOP PRACTICE

TOPIC: SHOP WORK AND PLANS/BLUEPRINTS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Doing shop work and using plans/blueprints	A. Reading plans/blueprints B. Measuring with inches, feet and yards C. Measuring with metric D. Marking for cutting and bending	A. Functional reading skills B. Vocabulary C. Following directions D. Interpretation of graphs and charts E. Interpretation of diagrams F. Test taking skills G. Problem solving	A. Whole numbers B. Fractions C. Metric measure D. Geometry E. Charts		A. The student will be able to read and interpret plans and blueprints B. The student will be able to read and use both traditional and metric measure C. The student will be able to pass a written test on using plans

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Using hand tools safely II. Using power tools safely	A. Hand tools 1. Common wrenches and screwdrivers 2. Hacksaws 3. Punches and chisels 4. Safety with hand tools 5. Care of hand tools 6. Vice grips 7. "C" clamps and other clamping and holding devices 8. Other hand tools B. Power tools 1. Safety 2. Grinders a. pedestal b. portable 3. Drill press 4. Portable drills 5. Cut-off saw 6. Band saw 7. Hydraulic presses 8. Electric cords 9. Other power tools	A. Vocabulary B. Following directions C. Note taking skills	Common fractions	A. Electricity B. Torque (applied physics) C. Hydraulics	A. The student will be able to identify with correct name, function, care and use of 70% of all hand tools in the lab B. The student will be able to demosntrate the correct and safe use of portable power tools C. The student will be able to recognize normal power tool problems D. The student will be able to identify parts of various power tools discussed in class E. The student will be able to complete a safety exam for each power tool

UNIT: INTRODUCTION TO THE WORLD OF

TOPIC: WELDING METALLURGY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Welding metallurgy	A. Properties of metals B. Structure of metals C. Carbon in steel D. Effects of heat E. Alloys F. Steel code system G. Stress H. Defects	A. Functional reading skills B. Vocabulary C. Note taking skills	A. Percentages B. Whole numbers	A. Applied physics 1. Force 2. Stress B. Corrision C. Alloys D. Heating F. Cooling	A. The student will be able to demonstrate a knowledge of metallurgy B. The student will be able to pass a written test with 70% accuracy

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Welding terms	A. Surface weld B. Fillet weld C. Groove weld D. Plug weld E. Butt weld F. Lap weld G. Corner weld H. Edge weld I. "T" weld J. Fit-up K. Root L. Bead M. Backing strip N. Flat position O. Vertical position P. Horizontal position Q. Overhead position R. Crater S. Multiple pass T. Penetration U. Weld V. Braze W. Other terms	A. Outlining and note taking B. Spelling C. Oral communications D. Test taking skills E. Vocabulary	Measurements - degrees	Gravity	A. The student will be able to know the terms common to the welding trade B. The student will be able to pass a written test on welding terms

UNIT: INTRODUCTION TO THE WORLD OF WELDING - CONTINUED

TOPIC: TYPES OF WELDING

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Types of welding	A. Electric 1. Shielded metal-arc welding (SMAW) 2. Gas tungsten-arc welding (GTAW) 3. Gas metal-arc welding (GMAW) B. Plastic welding C. Cutting D. Robotic E. Oxyacetylene welding (OAW) F. Others	A. Functional reading skills B. Vocabulary C. Note taking skills		A. Electricity B. Qualities of 1. Oxygen 2. Acetylene 3. CO_2 4. Argon C. Properties of metals	A. The student will be able to know the purpose of various welding procedures B. The student will be able to know the types of welding used today

UNIT: ELECTRIC WELDING

TOPIC: TERMS AND PRINCIPLES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Electric terms and electric principles	A. Alternating current (AC) B. Direct current (DC) C. Conductor D. Electrical circuit E. Ampere F. Volt G. Resistance H. Constant potential I. Voltage drop J. Open-circuit voltage K. Arc (working) voltage L. Variable voltage M. Polarity N. Duty cycle	A. Fact/Opinion distinction B. Functional reading skills C. Interpretation of diagrams, charts, etc. D. Outlining and note taking E. Signal words F. Vocabulary G. Test taking skills	A. Whole numbers B. Percentages C. Graphs D. Formulas	Electricity fundamentals	A. The student will be able to understand common electrical terms used during electric welding procedure B. The student will be able to understand electrical principles related to electrical welding procedures C. The student will be able to pass a written test on electric terms and principles

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Safety	A. Welding helmet B. Ultraviolet rays C. Sparks D. Safety goggles E. Gloves F. Apron and jacket G. Welding screen H. Ventilation I. Insulation J. Dangers with water K. Dangers with combustibles L. Welding cables	A. Fact/Opinion distinction B. Following directions C. Outlining and note taking D. Vocabulary E. Test taking skills		A. Ultraviolet rays B. Fire C. Heat D. Electric	A. The student will be able to understand how to work safely when using electric welding equipment B. The student will be able to understand the dangers to him/herself, others and the environment when using electric welding equipment C. The student will be able to pass a written and practical test on electric welding safety

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Understanding shielded metal-arc welding equipment	A. The electrode 1. Types 2. Coatings 3. Uses (selecting) 4. Identifying (AWS code) B. Electrode holder C. Ground clamp D. Cables E. The welder itself F. Heat controls	A. Interpretation of graphs and charts B. Parts of textbook/manuals	Whole numbers	A. Characteristics of steel B. Characteristics of oxygen C. Characteristics of hydrogen D. Electric arc	A. The student will be able to identify shielded metal-arc welding (SMAW) components B. The student will be able to adjust the controls on the shielded metal-arc welding equipment to raise and lower the heat
II. Essentials of arc welding (getting ready to weld)	A. Correct electrode B. Correct arc length C. Correct current and amperage D. Correct speed of travel E. Correct electrode angle F. Crater (pool) formation G. Underlapping and overlapping H. Cleaning I. Weaving	A. Note taking skills B. Oral communications C. Following directions	Measurements	A. Electricity B. Heat	The student will be able to strike the arc and run a basic bead

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
III. Types of welds	A. Flat position B. Butt joint 1. Open 2. Closed 3. V-groove C. Lap joint D. Horizontal position E. Vertical position F. Overhead position G. Welding cast iron H. Special welds I. Alloy steel welding J. Welding non-ferrous metals K. Tack weld	A. Parts of textbook B. Vocabulary C. Outlining and note taking D. Oral communications E. Following directions	A. Measurements B. Common fractions	A. Properties of steel, aluminum, bronze, etc. B. Electricity C. Heat	A. The student will be able to weld in various positions B. The student will be able to weld various types of metals
IV. Arc welding problems	A. Poor penetration B. Unstable arc C. Spatter excessive D. Arc goes out E. Loud arc F. Flux melts too quickly G. Hard to strike the arc H. Weak weld I. Ground clamp arcing J. Wide bead K. Wrong electrode angle	A. Following directions B. Interpretation of diagrams C. Problem solving	A. Whole numbers B. Common fractions	A. Electricity B. Heat/cooling	A. The student will be able to identify problems during the arc welding process B. The student will be able to correct problems during the arc welding process

UNIT: OXYACETYLENE TORCH

TOPIC: INTRODUCTION

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. What is the oxyacetylene torch	A. A mixture of oxygen and acetylene burning at temperatures of 1. 5700° to 6300° Fahrenheit 2. 3150° to 3482° Celsius B. Will melt all known commercial metals C. Is self-contained and can be made portable by using a hand cart	Oral communications	Whole numbers - temperatures	A. Heat B. Characteristics of metals	The student will be able to understand what the oxyacetylene torch is and why it is useful
II. Uses	A. Welding metals together B. Maintenance work C. Inexpensive small repairs D. Brazing E. Cutting F. Heating G. Other uses	A. Oral communications B. Note taking skills C. Fact/Opinion distinction			The student will be able understand the uses of the oxyacetylene torch

UNIT: OXYACETYLENE TORCH - CONTINUED

TOPIC: EQUIPMENT AND SUPPLIES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Oxyacetylene equipment and supplies	A. Oxygen 1. What it is 2. The cylinder 3. Safety disk B. Acetylene 1. What it is 2. The cylinder 3. Safety plugs C. Regulators 1. Single stage 2. Double stage D. Hoses E. Goggles for oxacetylene use F. Torch and tips 1. Number size 2. Care of tips G. Setting up equipment 1. Leak test 2. Secure tanks H. Other equipment (strikers, etc.) I. Safety J. Maintenance and care of equipment	A. Functional reading skills B. Vocabulary C. Following directions D. Outlining and note taking E. Spelling F. Oral communications G. Test taking skills	A. Whole numbers B. Percentages C. Proportion	A. Properties of oxygen B. Properties of acetylene C. Heat D. Pressurized gases	A. The student will be able to understand the properties of oxygen and acetylene B. The student will be able to understand the construction and safety features of oxygen and acetylene cylinders C. The student will be able to recognize, set-up and test the components of the oxacetylene torch D. The student will be able to understand the do's and don'ts of the oxyacetylene torch E. The student will be able to pass a written test on oxyacetylene welding equipment

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Oxyacetylene torch safety	A. Safety with pressurized oxygen and acetylene B. Fire safety C. Personal safety 1. Eye protection 2. Body protection D. Condition of equipment 1. Leaks 2. Torn hoses 3. Other	A. Fact/Opinion distinction B. Note taking skills C. Parts of textbook/manuals	Whole numbers	A. Gases under pressure B. Fire and heat C. Characteristics of oxygen D. Characteristics of acetylene	The student will be able to understand the safety procedures involved with the oxyacetylene torch

UNIT: OXYACETYLENE TORCH - CONTINUED

TOPIC: LIGHTING, HEATING AND BRAZING

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Lighting and adjusting the flame A. Flame problems (causes and corrections) B. Shut down of equipment	A. Lighting the torch using a spark lighter B. Adjusting to a neutral, carburizing and oxydizing flame C. Recognizing flame characteristics - flame problems D. Uses of various flames E. Tip selection F. Shut down of torch and equipment including "bleed down" of entire system G. Performance test	A. Note taking skills B. Interpretation of diagrams C. Following directions D. Problem solving E. Signal words F. Vocabulary	Whole numbers	A. Heat B. Characteristics of the three flame types (patterns) C. Pressure of gases	A. The student will be able to recognize, adjust and know the purposes of neutral, carburizing and oxidizing flames B. The student will be able to safely work with the torch flame(s) C. The student will be able to pass a performance test on this task
II. Heating with the oxyacetylene torch	A. Using the heat of the oxyacetylene torch to shape metals, loosen tight fitting parts, etc. 1. Bending 2. Loosening 3. Fitting - expansion of metal 4. Tempering B. Safety 1. Assume all metal is hot when using the torch 2. Follow all previous safety information	A. Following directions B. Outlining and note taking C. Parts of textbook D. Oral communications E. Performance test	A. Measurement - angles B. Measuring	A. Effects of heat on metal B. Characteristics of metals when carbon is added	A. The student will be able to use the oxyacetylene torch as a heat source when working with metals B. The student will be able to demonstrate the safe use of heat from the torch during a performance test

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
III. Brazing with the oxyacetylene torch	A. What brazing is B. Uses of brazing C. Brazing rods D. Flux coatings E. The brazing process F. Various braze joints and joint preparation G. Various brazing positions H. Running a bead I. Testing the brazed joint	A. Following directions B. Outlining and note taking C. Parts of textbook D. Interpretation of diagrams E. Oral communications F. Performance test	Measurements	Characteristics of heat on bronze	A. The student will be able to understand what brazing is, when it is used and its limitations in industry B. The student will be able to demonstrate safe use of brazing during a performance test using various joint designs

UNIT: OXYACETYLENE TORCH - CONTINUED

TOPIC: WELDING, CUTTING AND OTHER USES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Welding with the oxyacetylene torch	A. What welding is B. Uses of welding C. Welding rods D. Welding with filler rod E. Various welding joints and joint preparation F. Various welding positions G. Running a bead H. Testing welds	A. Following directions B. Outlining and note taking C. Parts of textbook D. Interpretation of diagrams E. Oral communications	Measurements	A. Characteristics of molten metal B. Characteristics of heat on metal	A. The student will be able to demonstrate an understanding of what oxyacetylene welding is, when it is used and its limitations in industry B. The student will be able to demonstrate the safe use of welding during a performance test using various joint designs
II. Cutting with the oxyacetylene torch	A. How the process takes place - oxidation of the metal B. Uses of cutting C. The cutting torch 1. Pre-heat flames 2. Construction 3. Identification of parts D. Lighting and adjusting the cutting torch 1. Oxygen and acetylene pressures 2. Adjusting to proper pre-heat flame E. The cutting (burning) process 1. Pre-heating 2. Burning F. Safety when cutting metals 1. No combustibles in the area 2. Proper eye protection 3. Proper clothing 4. Ventilation 5. Fire extinguisher ready	A. Fact/Opinion distinction B. Following directions C. Interpretation of diagrams D. Signal words E. Vocabulary	A. Whole numbers B. Graphs	A. Characteristics of heat on metal B. Oxidation of metals (burning) C. Temperature	A. The student will be able to demonstrate the set up, lighting and use of the oxyacetylene cutting torch B. The student will be able to demonstrate safe practices when operating the oxyacetylene cutting torch

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
III. Other uses of the oxyacetylene torch	A. Welding/brazing of cast iron 1. Preparing the repair 2. Pre-heating/post-heating treatment 3. Filler rod and flux selection 4. Cast iron welding process B. Welding aluminum 1. Preparing the repair 2. Choosing the joint design 3. Flux/filler rod selection 4. Pre-heating/cooling 5. Aluminum welding process C. Other uses	A. Fact/Opinion distinction B. Following directions C. Interpretation of diagrams D. Vocabulary	A. Whole numbers B. Graphs	Characteristics of heat on metals 1. Expansion/contraction of metals 2. Heat spread 3. Molten metal	A. The student will be able to demonstrate the welding of special metals B. The student will be able to demonstrate safe practices when welding special metals

UNIT: SHIELDED METAL-ARC WELDING (STICK WELDING)

TOPIC: TERMINOLOGY AND USES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Electric welding terminology	A. Alternating current (AC) B. Direct current (DC) C. Conductor D. Electrical circuit E. Amperage F. Volt G. Resistance H. Static electricity I. Dynamic electricity J. Voltage drop K. Open circuit voltage L. Arc voltage M. Variable voltage N. Polarity (straight/reverse) O. Shielded metal-arc welding	A. Vocabulary B. Spelling C. Outlining and note taking D. Test taking skills	A. Graphs B. Formulas C. Whole numbers D. Computation	A. Characteristics of alternating current B. Characteristics of direct current C. Resistance (theory and usage) D. Static/dynamic electricity E. Amperage F. Voltage	The student will be able to define and demonstrate an understanding of the terms used in electric welding processes
II. Uses of shielded metal-arc welding	A. Construction of steamships, locomotives and storage tanks B. Small items (construction and repair) C. Joins light and heavy metals of all kinds D. Maintenance of goods and machines E. Quick and easy by skilled operator	A. Oral communications B. Outlining and note taking C. Parts of textbook/manual D. Problem solving	A. Whole numbers B. Measurements C. Fractions D. Estimating	A. Characteristics of metal B. Electricity	The student will be able to demonstrate a knowledge of the uses for the shielded metal-arc welding process

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Shielded metal-arc welding equipment	A. Constant current machines B. Constant potential machines C. Transformers D. D.C. welders E. Rectifiers F. Personal equipment 1. Helments 2. Safety goggles 3. Gloves 4. Apron 5. Other personal equipment G. Electrode holder H. Cleaning tools I. Welding screen J. Cables and clamps K. Other equipment	A. Functional reading skills B. Interpretation of diagrams C. Interpretation of graphs and charts D. Oral communications E. Outlining and note taking F. Vocabulary G. Test taking skills	A. Whole numbers B. Graphs	A. Magnetism and electricity B. Electricity	A. The student will be able to demonstrate a knowledge of what equipment is used during shielded metal-arc welding B. The student will be able to demonstrate a knowledge of what personal protection to use when electric welding using shielded metal-arc welding C. The student will be able to pass a written test on shielded metal-arc welding equipment
II. Safety with electric welding	A. Refer to Electric Welding - Safety B. Safety with high-voltage electricity C. Eye protection 1. Helmet styles 2. Shielding lens 3. New style lens a. gold coated b. self darkening D. No flammables in welding area E. Safety with contact lenses F. Welding clothing	A. Functional reading skills B. Interpretation of graphs and charts C. Oral communications	Whole numbers	A. Electricity B. Ultraviolet rays C. Fire and heat	A. The student will be able to demonstrate an understanding of the dangers of electric welding B. The student will be able to choose the proper personal protection C. The student will be able to pass a written test on electric welding safety

TOPIC: THE PROCESS OF SHIELDED METAL-ARC WELDING

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. The shielded metal-arc welding process	A. Checking and adjusting the equipment B. Preparing the metal C. Choosing an electrode D. Striking the arc E. Running a bead 1. Controlling the crater 2. Undercutting 3. Overlapping 4. Cleaning the weld 5. Weaving the electrode 6. Various positions F. Welding problems G. Testing the welds H. Special welding situations	A. Following directions B. Functional reading skills C. Oral communications D. Signal words E. Outlining and note taking F. Interpretatation of diagrams	A. Common fractions B. Estimating C. Whole numbers D. Geometry E. Measuring	A. Characteristics of metals B. Gravity C. Electricity D. Ultraviolet rays E. Heat	A. The student will be able to set up, adjust and run a bead B. The student will be able to pass a performance test doing various types of welds using shielded metal-arc welding

UNIT: GAS TUNGSTEN-ARC WELDING

TOPIC: EQUIPMENT

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Gas tungsten-arc equipment	A. Advantages of gas tungsten-arc welding 1. No flux 2. Neat, sound welds 3. Little smoke, fumes and sparks 4. All positions 5. Other advantages B. Gas tungsten-arc welding machines 1. DC machines 2. AC machines 3. AC high frequency 4. DC reverse polarity C. Torches D. Electrodes E. Shielding gas F. Filler rod G. Protective equipment	A. Oral communications B. Outlining and note taking C. Interpretation of graphs and charts D. Functional reading skills E. Vocabulary F. Interpretation of diagrams G. Test taking skills	A. Whole numbers B. Measurements C. Fractions D. Weights and measures	A. Magnetism and electricity B. Electricity C. Compressed gases	A. The student will be able to demonstrate a knowledge of what equipment is used during gas tungsten-arc welding B. The student will be able to demonstrate a knowledge of what personal protective equipment to use when welding with gas tungsten-arc welding C. The student will be able to pass a written test on gas tungsten-arc welding equipment

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Preparing the joint and running the weld with gas tungsten-arc welding	A. Joint preparation 1. Cleaning 2. Butt joint 3. Lap joint 4. Corner joint 5. Edge joint 6. Other types of joints B. Running the weld 1. Check all equipment 2. Selecting the proper rod 3. Setting the machine 4. Starting the arc 5. Welding process a. horizontal b. vertical c. corner d. butt joint e. other types	A. Following directions B. Functional reading skills C. Oral communications D. Signal words E. Outlining and note taking	A. Common fractions B. Estimating C. Whole numbers D. Geometry	A. Characteristics of metals B. Gravity C. Electricity D. Ultraviolet rays E. Heat	A. The student will be able to set up, adjust and run a bead using the gas tungsten-arc welding process B. The student will be able to pass a performance test doing various types of gas tungsten-arc welds
II. Special processes using gas tungsten-arc welding	A. Automatic gas tungsten-arc welding B. Pulsed-current gas tungsten-arc welding C. Welding various metals 1. Carbon steels 2. Aluminum 3. Stainless steel 4. Magnesium 5. Copper 6. Low carbon steels	A. Fact/Opinion distinction B. Following directions C. Functional reading skills D. Interpretation of diagrams E. Outlining and note taking F. Signal words	A. Common fractions B. Estimating C. Whole numbers D. Geometry	A. Characteristics of metals B. Gravity C. Electricity D. Ultraviolet rays E. Heat	A. The student will be able to demonstrate a knowledge of the various special processes with gas tungsten-arc welding B. The student will be able to pass a performance test doing various types of gas tungsten-arc welds

UNIT: GAS METAL-ARC WELDING

TOPIC: EQUIPMENT

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Gas metal-arc welding equipment	A. Power supply B. Wire feed unit C. Welding gun D. Shielding gas 1. Argon 2. CO_2 3. Oxygen 4. Miscellaneous gases 5. Gas bottle 6. Gas regulator E. Wire electrode 1. Sizes 2. Make-up of wire a. mild steel b. aluminum c. stainless d. copper F. Other components	A. Functional reading skills B. Interpretation of diagrams C. Interpretation of graphs and charts D. Oral communications E. Outlining and note taking F. Vocabulary H. Test taking skills	A. Whole numbers B. Graphs C. Weights and measures	A. Magnetism and electricity B. Electricity C. Characteristics of compresses gases	A. The student will be able to demonstrate a knowledge of what equipment is used during gas metal-arc welding B. The student will be able to demonstrate a knowledge of what personal protection to use when using the gas metal-arc welding process C. The student will be able to pass a written test on gas metal-arc welding equipment

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Advantages/uses of gas metal-arc welding	A. Saves cost because of no slag and minimum clean up time B. Less time to train operator than other welding methods C. The process is fast D. Better metallurgical benefits 1. Narrow heat zone 2. Less grain growth 3. Less distortion E. Good on thin metals F. Small fillets compared to other welding methods	A. Fact/Opinion distinction B. Functional reading skills C. Interpretation of diagrams D. Oral communications E. Outlining and note taking F. Vocabulary	A. Measurements B. Geometry C. Whole numbers D. Ratio/proportion	A. Metallurgy B. Characteristics of metals C. Compresses gases D. Gravity E. Heat F. Electricity	The student will be able to demonstrate a knowledge of the advantages of using the gas metal-arc welding process
II. Gas metal-arc welding process	A. Checking and adjusting the equipment 1. Current 2. Wire size 3. Wire speed 4. Gas flow 5. Ground clamp B. Safety using gas metal-arc welding equipment C. Types of metal transfer 1. Spray 2. Globular 3. Short circuiting D. Positioning of work and electrode E. Welding procedure F. Defects G. Welding various metals with gas metal-arc welding 1. Carbon steel 2. Aluminum 3. Stainless steel	A. Following directions B. Functional reading skills C. Oral communications D. Signal words E. Outlining and note taking F. Interpretation of diagrams	A. Common fractions B. Estimating C. Whole numbers D. Geometry E. Measuring	A. Gravity B. Characterics of metals C. Ultraviolet rays D. Heat E. Compressed gases	A. The student will be able to set up, adjust and run a bead B. The student will be able to pass a performance test doing various types of welds using gas metal-arc welding

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
III. Special processes using gas metal-arc welding	A. Buried arc CO_2 process B. Pulsed-arc C. Flux-core D. Vapor-shielding E. Submerged arc welding	A. Interpretation of diagrams B. Oral communications C. Problem solving D. Outlining and note taking E. Parts of textbook/manual	A. Graphs B. Measurements C. Geometry D. Whole numbers	A. Characteristics of metals B. Compressed gases C. Gravity D. Heat E. Electricity F. Ultraviolet rays	The student will be able to demonstrate a knowledge of special processes used for unusual applications of the gas metal-arc welding process

UNIT: FLUX-CORED ARC WELDING (FCAW)

TOPIC: EXPLANATION, ADVANTAGES AND LIMITATIONS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
	A. Explanation of flux-cored arc welding B. Uses tubular, flux-filled consumable electrode in a spool form 1. Self-shielded 2. Dual-shielded 3. Semi-automatic 4. Automatic C. Sometimes call "innershield" D. Gives good deposition rate compared to GMAW - fast - for production welding E. Cuts costs compared to GMAW F. No need for 1. Flow meters 2. Shielding gas 3. Piping hoses G. Can be used in windy or vented areas H. Simple operator training I. Limitations 1. creates smoke in work area 2. Clean up of slag required	A. Fact/Opinion distinction B. Following directions C. Interpretation of diagrams D. Outlining and note taking E. Parts of textbook/manual F. Vocabulary G. Oral communications H. Problem solving	A. Graphs B. Measurements C. Common fractions D. Whole numbers	A. Heat B. Electricity C. Chemical reactions D. Compressed gases	A. The student will be able to demonstrate an understanding of flux-cored arc welding and its purposes B. The student will be able to demonstrate a knowledge of the definitions of various forms of flux-cored arc welding C. The student will be able to demonstrate a knowledge of the advantages and limitations of flux-cored arc welding

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Understanding flux-cored arc welding equipment	A. Constant voltage DC power source B. Electrode feed unit C. Reel of continuous flux-cored electrode 1. Sizes 2. Types 3. Code breakdown D. Connecting cables E. Gun assembly F. Personal protective equipment G. Miscellaneous equipment	A. Interpretation of diagrams B. Parts of textbook/manual C. Oral communications	A. Measurements B. Common fractions	A. Electricity B. Ultraviolet rays	The student will be able to demonstrate an understanding of the equipment necessary for the flux-cored arc welding process

UNIT: FLUX-CORED ARC WELDING (FCAW) - CONTINUED

TOPIC: SAFETY

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Understanding safety procedures used with flux-cored arc welding	A. Personal safety, including good ventilation B. Welding helmets 1. Types 2. Lens numbering system C. No combustibles in area D. Be careful of motor driven wire E. Electric safety F. Ultraviolet safety G. Flying spark danger H. Welding curtains I. Protections of others J. Other safety with flux-cored arc welding	A. Fact/Opinion distinction B. Following directions C. Oral communications D. Outlining and note taking E. Test taking skills	Whole numbers	A. Heat B. Fire C. Ultraviolet rays D. Electricity	A. The student will be able to demonstrate an understanding of how to work safely with the flux-cored arc welding equipment B. The student will be able to demonstrate an understanding of how to protect him/herself and others from the dangers of the flux-cored arc welding process C. The student will be able to pass a safety test on the flux-cored arc welding process

UNIT: FLUX-CORED ARC WELDING (FCAW) - CONTINUED

TOPIC: PROCESS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Understanding of the flux-cored arc welding process	A. Set up of equipment 1. Adjustments 2. Choosing proper electrode 3. Cleaning B. Set up of workpiece C. Problems during flux-cored arc welding process 1. Travel speed 2. High/low voltage 3. Wire feed speed 4. Wire stickout 5. High/low current 6. Other problems D. The flux-cored arc welding process 1. Cut end of wire 2. Position electrode 3. Squeeze trigger to start arc and wire feed 4. Move gun in or out to adjust stickout 5. Release trigger to stop arc and wire feed 6. Clean weld area 7. Check/test your work 8. Shut down equipment	A. Functional reading skills B. Following directions C. Identifying main ideas D. Parts of textbook/manual E. Problem solving F. Vocabulary G. Test taking skills H. Oral communications	A. Common fractions B. Geometry C. Measurements D. Whole numbers E. Basic trigometric functions	A. Characteristics of metals B. Chemical reactions C. Heat D. Ultraviolet rays	A. The student will be able to demonstrate the proper set up and adjustment of the flux-cored arc welding equipment B. The student will be able to set up a workpiece in preparation for flux-cored arc welding C. The student will be able to demonstrate the flux-cored arc welding process on a workpiece chosen by the instructor D. The student will be able to identify and correct problems during the flux-cored arc welding process E. The student will be able to pass a test on the flux-cored arc welding equipment and process

UNIT: PLASTIC WELDING

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Types of plastics	A. Thermo plastic B. Thermo setting	A. Fact/Opinion distinction B. Functional reading skills C. Oral communications D. Problem solving E. Outlining F. Test taking skills	A. Whole numbers B. Fractions	A. Characteristics of plastics B. Heat C. Matter	
II. Types of plastic welding	A. Hot gas B. Heated tool C. Induction D. Friction E. Safety F. Processes	A. Fact/Opinion distinction B. Functional reading skills C. Oral communications D. Problem solving E. Outlining F. Test taking skills		A. Characteristics of plastics B. Electricity C. Heat D. Compressed gases	
III. Uses of plastic welding	A. Pipes B. Automotive C. Fabrication D. Other	A. Fact/Opinion distinction B. Functional reading skills C. Oral communications D. Problem solving E. Outlining F. Test taking skills		A. Characteristics of plastics B. Heat C. Gravity	

UNIT: SPECIAL WELDING PROCESSES

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Special welding processes	A. Surfacing 1. Types of wear 2. Various welding methods used for surfacing 3. Hardfacing 4. Metalizing 5. Procedure 6. Safety B. Pipe welding 1. Process 2. Joint preparation 3. Automatic pipe welding 4. Safety C. Cutting 1. Flame cutting 2. Air-carbon arc cutting 3. Safety 4. Special cutting procedures D. Brazing E. Production welding 1. Resistance 2. Spot 3. Pulsation 4. Seam 5. Projection 6. Butt welding 7. Equipment 8. Procedures 9. Electron beam 10. Laser 11. Inertia 12. Plasam arc 13. Ultrasonic 14. Electro-gas 15. Newer methods F. Robotics	A. Functional reading skills B. Interpretation of diagrams C. Oral communications D. Parts of textbook/manual E. Spelling F. Vocabulary G. Problem solving H. Outlining and note taking I. Test taking skills	A. Fractions B. Computation C. Graphs D. Geometry E. Measurements F. Metric G. Whole numbers	A. Gravity B. Ultraviolet rays C. Laser Theory D. Plasma theory E. Electricity F. Matter G. Compressed gases	A. The student will be able to demonstrate an understanding of the need for special weld processes B. The student will be able to demonstrate a knowledge of various special weld processes C. The student will be able to set up and operate selected special welding processes safely D. The student will be able to pass a written test on special welding processes

UNIT: FABRICATION

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Lay out (measuring)	A. Using measuring instruments 1. Rulers 2. "T" square 3. Protractor 4. Dividers 5. Markers 6. Other devices B. Set up C. Blueprint reading 1. Reading symbols 2. Turning the blueprint into the product	A. Functional reading skills B. Interpretation of diagrams C. Interpretation of graphs and charts D. Oral communications E. Outlining and note taking F. Problem solving G. Spelling H. Vocabulary I. Identifying main ideas	A. Measurements B. Common fractions C. Decimals D. Estimating E. Geometry F. Whole numbers G. Metric H. Ratios		A. The student will be able to demonstrate the laying out of a welding job including transfering blueprint readings to the actual job B. The student will be able to pass a written test on blueprint reading
II. Fabricating	A. Cutting (machine, torch) 1. Cutting parts to fit the project 2. Choosing the best cutting methods for a particular job B. Joint design 1. Design of best type of joint for each portion of the job 2. Fit up of the cut parts C. Assembly (using the knowledge taught)	A. Fact/Opinion distinction B. Following directions C. Problem solving D. Interpretation of diagrams	A. Computation B. Formulas C. Geometry D. Metric E. Graphs	A. Characteristics of metals B. Heat C. Fuels D. Ultraviolet rays E. Gravity	A. The student will be able to pass a performance test of fabrication of a product from cutting/fitting to completion of the product B. The student will be able to pass a written test on the steps to fabricate a produce

UNIT: MISCELLANEOUS WELDING INFORMATION

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Testing of welds	A. Visual B. Destructive 1. Uniformity 2. Bending 3. Etching 4. Impact 5. Other C. Nondestructive 1. Magnetic 2. Dye 3. Eddy current 4. Radiographic 5. Ultrasonic 6. Hardness 7. Other	A. Following directions B. Functional reading skills C. Interpretation of diagrams D. Interpretation of graphs and charts E. Outlining and note taking F. Spelling G. Test taking skills H. Vocabulary	A. Common fractions B. Decimals C. Estimating D. Formulas E. Graphs F. Geometry G. Measurements H. Percentages I. Whole numbers	A. Characteristics of metals B. Heat C. Electricity D. Magnetism E. Matter F. Chemicals G. Stress	A. The student will be able to demonstrate a knowledge of why it is important to have careful testing methods B. The student will be able to demonstrate an understanding of how varous weld tests are done C. The student will be able to pass a written test explaining how selected weld tests are performed
II. Understand weld symbols	Weld Symbols 1. Butt 2. Corner 3. Edge 4. Lap 5. "T" 6. Fillet 7. Plug (or slot) 8. Arrow side 9. Bevel 10. Flare 11. Special details 12. Strength 13. Size 14. Number of welds 15. Other weld symbols	A. Vocabulary B. Spelling C. Functional reading skills D. Interpretation of diagrams E. Following directions	A. Common fractions B. Computation C. Measurements D. Basic trigonometric function E. Whole numbers F. Geometry		The student will be able to read and interpret welding symbols

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
III. Welder's certification	A. Code B. Standards C. Specifications D. Requirements E. Certification 1. Procedure 2. Qualifications 3. Becoming certified a. where? b. who? c. how?	A. Fact/Opinion distinction B. Following directions C. Oral communications D. Outlining and note taking	A. Fractions B. Measurements C. Geometry	A. Heat B. Electricity C. Compressed gases D. Ultraviolet rays E. Characteristics of metals F. Gravity G. Fuels	A. The student will be able to demonstrate a knowledge of why certification is required on various welding jobs B. The student will be able to demonstrate a knowledge of the requirements to certify various types of welding processes C. The student will be able to demonstrate a knowledge of how and where to become certified